

1990 Los Angeles Times, July 10, 1990

Hungary, Czechoslovakia and Poland have little cash to contribute to the overhaul. The onus will be on Western investors and potential subscribers to put up starting capital.

The Hungarian ventures depend on advance payments from their clientele to provide capital for building new digital switching stations.

Contel-Hungaria promises 21% interest on the deposits if no service is provided within a year -- a worrisome reminder of the region's difficulty with deadlines.

And the future is uncertain. Both Contel and US West are involved in joint ventures in which the Hungarian partners won exclusive license to their radio frequencies because of contacts in government agencies -- a holdover advantage from monopoly days that may not endure as competition strengthens.

One positive impetus to the new projects was the decision by the Coordinating Committee on Multilateral Export Controls -- Cocom -- in early June to relax restrictions on technology transfers to nations no longer considered a threat to Western security.

However, Cocom has been less willing to clear exports for the Soviet Union, the biggest market for telecommunications contracts. US West was denied export authorization to lay a fiber optic cable across the Soviet Union on the grounds that the technology has military applications.

#### Who Has the Phones

Telephones per 1,000 residents:  
Soviet Union: 115  
Poland: 118  
Yugoslavia: 12  
Romania: 130  
Hungary: 134  
Bulgaria: 200  
East Germany: 211  
Czechoslovakia: 226  
Japan: 535  
West Germany: 641  
United States: 650

SOURCE: Organization for Economic Cooperation and Development

GRAPHIC: Photo, a telephone

SUBJECT: TELEPHONE INDUSTRY -- EASTERN EUROPE; TELECOMMUNICATIONS -- EASTERN EUROPE; TECHNOLOGY

LEVEL 1 - 48 OF 53 STORIES

Copyright 1990 The Time Inc. Magazine Company  
Time

July 9, 1990, U.S. Edition

SECTION: BUSINESS; Pg. 51

LENGTH: 277 words

HEADLINE: Always on Call;  
Motorola hopes to connect the globe with cellular phones

BODY:

First came cordless phones, which made it possible to take all those irritating calls while mowing the lawn or relaxing in the hammock. Before long, cellular phones eliminated the commuter's peace and quiet on the highway. Now, if Motorola has its way, being unreachable is going to be downright impossible.

The suburban Chicago electronics giant (1989 sales: \$9.6 billion) hopes to put in place by 1996 a network of 77 satellites that can relay phone calls to any spot on the planet. That means when the boss has a question, no Himalayan mountaintop or African jungle encampment will be beyond the reach of the ringing phone. Named Iridium, for the chemical element whose nucleus is orbited by 77 electrons, the Motorola plan would constitute the first global cellular system. Calls would cost \$1 to \$3 a minute, compared with about 50 cents a minute for cellular calls within urban systems linked by radio towers. Potential users include traveling executives and mining engineers who work in remote locations.

While Motorola stands ready to supply the handsets (initial price: \$3,500 apiece), the company will need investment partners to finance the estimated \$2.3 billion cost of building and launching the network of 700-lb. satellites. The firm is negotiating a joint venture with British Telecom, as well as with potential investors in Japan, Australia and Hong Kong. Motorola estimates that Iridium will need 700,000 users to become profitable. While that is roughly equivalent to the Pittsburgh white pages, it is less than 1% of the 100 million people around the world who are expected to be using cellular phones by the end of the decade.

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Copyright (c) The Financial Times Limited, 1990;  
FinTech Mobile Communications

July 5, 1990

SECTION: FINANCE/BUSINESS

LENGTH: 280 words

HEADLINE: Motorola outlines Iridium plans

KEYWORD: Motorola Iridium mobile communications network

BODY:

US manufacturer Motorola has revealed details of its proposed Iridium global mobile communications network (Mobile Communications 21/3). It said last week that it plans to launch the system by 1996 -- if a host of regulatory and financial hurdles can be surmounted.

Handsets for the system will be very small by satellite standards, about eight inches in length and two inches wide, but with an expected retail price of \$ 3,500 they are not be cheap. Indeed there is considerable scepticism in the City about the proposals. Analysts remain unconvinced by the economics of the network. Motorola says, for instance, that it would need a minimum of 700,000 subscribers worldwide, each paying \$ 100 a month, if it is to break even.

Motorola is proposing to set up an international consortium of companies to pick up the \$ 2 billion tab for the system. It is understood to have approached a number of telecommunications companies and satellite organisations to participate in the Iridium project (so-called because the atomic number of Iridium is 77 -- the number of mini-satellites that the system would use).

A memorandum of understanding on a year-long feasibility study on the project has been signed by Motorola, Inmarsat, the American Mobile Satellite Corporation and Telesat Mobile of Canada (Mobile Communications, 55/10). The joint study will look at the business and technical issues raised: it is understood that the four organisations will share the costs.

Motorola's plans call for two demonstration satellites to be placed in low-earth orbit in 1992. The implementation of the whole system will begin in 1994 and full service could be offered by 1996.

SUBJECT:

Satellite communications; Company news; Research

ORGANIZATION:

Motorola; Inmarsat; American Mobile Satellite Corporation; Telesat Mobile

GEOGRAPHIC:

USA

LEVEL 1 - 50 OF 53 STORIES

Copyright 1990 The Washington Post  
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July 4, 1990, Wednesday, Final Edition

SECTION: FINANCIAL; PAGE D3; DAVID WARSH

LENGTH: 1279 words

HEADLINE: Did Motorola Know About 'Great Wipeout' Theory When It Named Phone System?

SERIES: Occasional

BYLINE: DAVID WARSH

BODY:

Everything but the humor was overlooked last week when Motorola Inc. rolled out its plans for a network of go-anywhere telephones linked by 77 satellites ringing the Earth. We're calling it 'Iridium,' the company said, because the iridium atom has 77 electrons orbiting its nucleus -- just like our plan to put up precisely enough satellites to ensure that one orbiter is always above the horizon from any corner of the Earth.

In fact, there is a deeper significance to the word iridium in these circumstances that can't -- or at least oughtn't -- have been lost on the framers. And in the telling of the story is a lesson about the astonishing rate of technical and industrial changes in global telecommunications -- and about the high-stakes competition among American and Japanese companies that will chart the way.

For in the current circumstances in the telecommunications industry, calling your new low-orbit phone setup iridium is a little like naming the burglar alarm system you plan to introduce in Germany 'Overlord.' Or selling new 'Tora-Tora' brand home mortgages in the United States.

The only question is, did Motorola do it accidentally, or on purpose?

The story begins with the late Luis Alvarez, a University of California at Berkeley physicist who began a second career late in life in 1979 when his geologist-son presented him with an interesting striped rock.

The stripe consisted of a layer of clay that had been laid down in a relatively brief span 65 million years before, and turned out to contain unusually high levels of iridium. And armed with that surprising fact, within a relatively brief time, Alvarez cobbled up an impact theory of mass extinctions that has been convincing the relevant scientific communities ever since.

What Alvarez concluded was that the dinosaurs were the victim of a colossal collision. When a big asteroid hit Earth 65 million years ago it threw up a dust cloud that rendered the sky dark for several years, blocking photosynthesis -- and so killing through starvation the dinosaurs and every other animal bigger than 50 pounds.

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The Washington Post, July 4, 1990

How do we know it wasn't a volcano? Well, it turns out that meteorites and other extraterrestrial materials have 10,000 times more iridium and other platinum group metals than Earth. Only a vaporizing giant meteor, six miles across, could have put into the air the iridium-rich dust that fell to form the stripe of clay.

Thus, the central connotation of iridium, at least to scientists who have followed the controversy in the professional and popular press, is not its atomic weight, fundamental though that may be. The really interesting thing about iridium is that a cloud of it around the Earth is what occasioned the dinosaur Great Wipeout.

Cut now to the telecommunications industry. Ever since William McGowan took advantage of a new technological wrinkle to start selling long-distance telephone services in competition with AT&T in 1969, the industry has been changing mighty fast.

The federal consent decree that broke the Bell System into several operating companies in 1981, the entry of a large number of new equipment suppliers into the business, the emergence of rival technologies in cable and wireless transmission, the rapid internationalization of trade -- all have played a part in furthering this "information revolution."

But for the last few years, no part of it has been hotter than the exploding market for cellular telephones. These mobile telephones were said to be America's great new growth industry, and investors thrilled to the race to build a great new cellular company between Craig McCaw and the several rival Bell operating companies seeking the same markets.

Meanwhile, an entirely different business is starting up in England, aimed at doing the same thing. Dubbed PCN, for personal communications network, the new technology is supposed to equip consumers with lightweight "Dick Tracy"-style telephones that permit them to carry their business and the same phone number wherever they go. Like cellular companies, PCN companies operate essentially by putting up little transmitters on telephone poles all over the cities they serve -- but the technologies are otherwise significantly incompatible.

It was precisely these cellular companies that Motorola sought to reassure last week in New York when it rolled out its plans for a new system of putting the transmitters up in space. After all, Motorola probably is the single biggest supplier in the world to the infant cellular telephone industry. Along with Japan's NEC, it offers a completely integrated line of the vital components: The base stations that companies strew around their license areas in cells, switches that fling signals from one cell to another and the telephones themselves.

No wonder, then, that Motorola spokesmen seemed to bend over backward to say their new service would be a complement to the cellular industry, not a substitute. Satellites would be useful for serving ships at sea, for airplanes, for the occasional traveler on Interstate 80 between Cheyenne and Cody, or in the Gobi desert.

But the system would cost too much for everyday use, said Motorola -- \$ 3 a minute, say, against 30 cents for cellular traffic. It would be difficult to engineer high volumes. And then there were the little 3-inch dish antennae

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The Washington Post, July 4, 1990

that users of the phones would require.

But would cost and complexity really prevent Iridium from ultimately becoming the global telephone delivery system of choice? Given the enormous technical problems to be solved, it is all but impossible to say. For now, Motorola says the research and development necessary to pursue the plan is nothing more than the company would spend anyway. And in the end, as Stephen Galle, a partner at Boston's TA Associates says, "It all depends on how they price it. Conceivably, it wouldn't even be a 'cellular' system anymore -- if the calls don't drop out when you switch from one cell to another, that could be a higher level of service."

So if you wanted to reassure your customers, all those big firms striving to become still bigger ones, the better to dominate the surface of the Earth, why would you call your new project Iridium?

Did Motorola mean it?

Remember that these are very sophisticated people. They've been in space since the race to the moon began. They've been on the fringes of the Strategic Defense Initiative with its "brilliant pebbles" concept of a network of decentralized satellites.

They know just how quickly technology can twist and turn in unexpected directions. They have competed very successfully toe-to-toe with the Japanese. They know the difficulties of raising capital in a fickle stock market. And they stand at the pinnacle of the telecommunications and computer industries, which are already the most profitable and powerful in the world -- and are likely to become even more so in the next century.

Motorola spokesmen say they were completely unaware of the second, the "Great Wipeout," connotation of iridium, beyond its atomic weight, until the last moment, when somebody brought it up.

"There is no hidden meaning to it," says Lawrence Moore, public relations manager of its government communications division.

Are Motorola's engineers cocky enough to have called attention to the strategic possibilities of their project on purpose? It will be years before we really know. The story of the Iridium project is either a rare glimpse into the innermost workings of a world-class technology firm, or a public relations flub of memorable proportions. Quite possibly it is both.

David Warsh is a columnist for the Boston Globe.

TYPE: COLUMN

SUBJECT: TELECOMMUNICATIONS; TELEPHONES; COMMERCIAL SATELLITES; TECHNOLOGY

ORGANIZATION: MOTOROLA INC.

NAMED-PERSONS: LUIS ALVAREZ

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LEVEL 1 - 51 OF 53 STORIES

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Aviation Week and Space Technology

July 2, 1990

SECTION: HEADLINE NEWS; Vol 133, No. 1; Pg. 29

LENGTH: 895 words

HEADLINE: Motorola Proposes 77 Lightsats For Global Mobile Phone Service

BYLINE: JAMES R. ASKER

DATELINE: NEW YORK

BODY:

Motorola, Inc., is leading an effort to build a \$ 2.3-billion light satellite network to relay radio-telephone calls to and from remote and mobile users anywhere on Earth.

The heart of the network -- dubbed Iridium, for the 77th natural element -- would be a constellation of 77 satellites. Each would measure about 2 meters tall by 1 meter in diameter with a mass of 315 kg. (700 lb.) and circle the globe from pole to pole in a low orbit of 765 km. (413 naut. mi.). Following a demonstration set for 1992, the spacecraft would likely be launched six or seven at a time on medium-class expendable vehicles. After completion of the network, planned for 1996, replacements would be launched as needed on small rockets, such as Orbital Sciences Corp.'s Pegasus. The scheme would allow Iridium to make continual technical improvements over the years as satellites are replaced.

Motorola, a pioneer in both spacecraft electronics and mobile communications, expects to invent nothing new to create the system. However, the company, which is the first large manufacturer to win the Malcolm Baldrige National Quality Award, says Iridium will establish "the world's first high-volume satellite production line."

If that is accomplished -- and if Motorola achieves the capability to launch replacement satellites within 36 hr., as it ultimately intends to demand of its launch service providers -- Iridium would mark a major technological advance that would bode well for the commercial development of space.

Nonetheless, the more difficult challenge of the project promises to be putting together the proper pieces of the worldwide telecommunications regulatory puzzle and assembling a compatible team of business and noncommercial partners with sufficient financial wherewithal.

Motorola, which has been working on the project 2 1/2 years, would like to serve only as the manufacturer of Iridium spacecraft and the 25-oz. radio-phone units that subscribers would use. However, John T. Mitchell, the vice chairman of the board, said the company is prepared to invest as much as 20%, or about \$ 400 million, of the project's cost.

The project is projected to require some \$ 2.1 billion to build and launch the low Earth orbiting lightsats and about \$ 200 million to construct "gateway" ground stations, which would connect the network to the world's

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conventional telephone systems.

Last week, the International Maritime Satellite Organization (Inmarsat), American Mobile Satellite Corp. and Telesat Mobile, Inc., of Canada said they have signed agreements with Motorola to analyze the technical and business aspects of the project with an eye toward becoming the first members of an Iridium consortium. Officials expect initially to charge callers \$ 1-3 per minute. For the system to be viable, it must grow to 600,000-800,000 users in the first five years, they said.

In essence, Iridium is a cellular telephone system turned upside down. Instead of users moving through cells established by ground stations, the cells move overhead as satellites pass over the users.

Each spacecraft 'projects' 37 cells about 360 naut. mi. across by using L-band, phased-array antennas on each satellite. The spacecraft would use advanced computer electronics to form a 'smart' network to relay calls among themselves in the Ka band, according to Raymond J. Leopold, the project's systems engineering manager.

The system is designed to operate within the 1-3-GHz. region with bandwidths of 29 MHz. uplink and downlink, with the expectation that spectrum allocation will grow with system demand. Gateways and crosslinks will operate near 20 GHz.

Besides carrying voice at rates of 4,800 baud, the network could handle data streams at 2,400 baud.

The Iridium system is not intended to replace conventional cellular telecommunications. Existing cellular service is likely to remain more economical for terrestrial use throughout most of the U. S. and Europe.

Iridium's market is more apt to be for communicating with regions that do not have cellular systems or that lack reliable land lines; for communications at sea, in the air and during natural disasters; and for calling subscribers whose location is unknown. However, Iridium's planners envision handsets that could automatically select the cheaper, terrestrial cellular service when practicable, so remote users would not have to carry two mobile phones.

The large number of low Earth orbiting satellites was selected over a few geostationary spacecraft because they allow for much lower-powered transmitters. Also, because the satellites' orbits are low, voice delays and echoes would not be perceptible, as they are with relays using geostationary spacecraft, Iridium designers say.

The satellite constellation would be arranged in seven orbital planes of 11 spacecraft each. The satellites will be designed to last five years in space and would be deorbited to minimize debris.

Initially, the Schaumburg, Ill., electronics giant would subcontract most of the satellite manufacturing, but it intends to evolve an in-house capability to make about half the spacecraft components. And while Motorola seeks to establish itself as the leader in making the portable phones for Iridium, officials said they would issue specifications so that other manufacturers around the world could produce them as well.

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GRAPHIC: Photograph, Iridium satellite model shows phased-array L-band antennas covering six sides and part of bottom, along with Ka-band antennas. A pop-up mast keeps extended solar panels from blocking antennas.

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Copyright 1990, Network World, Inc.  
Network World

July 2, 1990

SECTION: TOP NEWS; Pg. 1

LENGTH: 685 words

HEADLINE: Motorola to build global cellular net

BYLINE: By Paul Desmond, Senior Editor

DATELINE: NEW YORK

BODY:

Motorola, Inc. last week said it will build a \$2.3 billion global voice and data cellular network supported by 77 low-orbit satellites.

The satellites used for Motorola's planned Iridium network will act as a digital switching system in space that supports communications to remote locations where cellular -- or possibly even terrestrial -- telephone service is not offered today. The net will be linked to public switched telephone networks and existing cellular nets.

Iridium could be a boon to trucking, maritime, oil and aviation companies, as well as other businesses that need to track cargo and keep in touch with employees in hard-to-reach locations, said John Knudsen, manager of user terminal development at Motorola.

"It sounds like an extremely interesting concept," said Nick Noecker, manager of field operations for Tenneco Gas in Houston. "We would have an immediate use for it along at least half of our pipeline," which travels from the Gulf Coast to both the Northeast and the Chicago area. He said existing cellular systems cover less than half of that area.

Motorola is forming a consortium of firms that will fund and operate Iridium, which is scheduled to be fully operational in 1996, Motorola's Knudsen said.

The consortium will also help Motorola in what is expected to be a formidable regulatory challenge over licensing for Iridium. In the U.S., Motorola has to file a detailed system proposal with the Federal Communications Commission, which it has not yet done, although Knudsen said Iridium will use frequencies between 1.5 and 1.6 GHz.

"There are a lot of other services currently operating in those frequencies," said an FCC source who requested anonymity. "There probably would be a problem. Depending on what frequencies they pick, there might need to be a reallocation" of existing frequency licenses. The source said other aeronautical, maritime and mobile satellite services use frequencies within the range proposed by Motorola.

A similar process would have to be completed in each country in which Iridium will be offered, as well as with organizations charged with

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1990 Network World, July 2, 1990

frequency allocation on an international basis, according to the FCC source.

Lawrence Moore, manager of public affairs for Motorola's Government Electronics Group, said the company expects the partners in its consortium will already have licenses in many countries for frequencies within the 1.5- to 1.6-GHz spectrum.

So far, Knudsen said, those partners include three existing satellite communications suppliers: American Mobile Satellite Corp. in Washington, D.C., International Maritime Satellite Organization in London and Telesat Mobile, Inc. in Ottawa.

Those companies use satellites that are in a geostationary orbit more than 22,000 miles above the earth. Such satellites can serve only a limited portion of the earth's surface.

Iridium will be based on satellites operating 413 nautical miles above the earth in seven different polar orbits, with 11 satellites in each orbit. Each satellite will serve as many as 37 cells on earth, with each cell about 360 nautical miles in diameter. Satellites will be able to hand off calls to adjacent satellites in the same orbit, and gateways will be built to pass calls between satellites in different orbits, Knudsen said.

The number and orbit of the satellites ensures a continuous line of site to at least one satellite from any point within 100 miles of the earth's surface, he said.

Iridium will support 4.8K bit/ sec digital voice, which he said is standard for satellite voice, and data at up to 2,400 bit/sec.

Motorola will publish the specification for how to access the system, which means any vendor could supply user terminals and radiotelephones. Only about three watts of power will be required in such devices, along with a 3-in. antenna.

Motorola plans to use a fast packet switching technique between satellites, although the switching equipment has yet to be determined, he said. Motorola will launch two satellites in 1992 and seven by 1994, all for testing the system. All 77 satellites are expected to be up in 1996.

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July 2, 1990, Monday

Pg. 30

462 words

Mobile phones have the answer

BODY:

A SOPHISTICATED plan to provide mobile telephones on a worldwide network could be blocked by the global shortage of radio frequencies. The international telecommunications authorities allocate radio frequencies for mobile communications services relayed by satellite. But the radio spectrum is already crowded, according to a spokesman for Inmarsat, the international satellite organisation. Last week, Motorola unveiled plans for a network of small satellites to provide direct connections via portable telephone between subscribers anywhere in the world. To turn its new plan into a viable proposition, Motorola and its partners will need to do some strong lobbying in order to get more frequency space made available. The plan, which could come into service as early as 1996 if finance and regulatory clearance can be obtained, involves 77 satellites orbiting at a distance of only 400 miles above the earth's surface. Their signal can be picked up by a small aerial, the same size as that on an ordinary portable phone.

The satellites will relay calls into the public telephone networks in any country that chooses to connect to the network

The system, christened Iridium, is not an alternative to existing mobile telephone systems. It is most likely to appeal to ship and boat owners, who can currently only get a telephone line by installing a large receiver dish, and to people in remote locations, where telephone lines are expensive to install. It could be adapted for use in aircraft.

Motorola has already invested several million dollars in development, but £1.4 billion is needed to fund the global system. The company is hoping to attract national telephone companies and international satellite regulatory bodies as partners in a consortium to build and operate it. David Bartram, senior vice president of Motorola Europe, estimates the system could break even with 700,000 subscribers, which he would expect to have enrolled in the second or third year of service.

He believes that implementation of the network could begin in 1994, for a commercial launch in 1996. A feasibility study is currently being undertaken in collaboration with Inmarsat, the international satellite organisation in which most major telephone companies participate. Similar studies are being conducted with two North American bodies which control satellite services.

If those organisations continue to support the project then the co-operation of key national administrations will be virtually assured. If they were to choose to pull out, Motorola would find it harder to get permission from national governments to sell Iridium services. It would then have to set up a new body to negotiate downlink rights for its satellites into each individual country.

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